ABSTRACT

The present invention generally relates to the treatment of uremic toxins *in vivo* using uremic toxin-treating enzymes, and/or cells capable of producing uremic toxin-treating enzymes or otherwise reacting with uremic toxins. Non-limiting examples of cases where the treatment of uremic toxins is desired include renal disease or dysfunction, gout, subjects receiving chemotherapy, or the like. In one aspect, the treatment includes an oral delivery composition able to reduce the blood concentration of one or more non-protein nitrogen compounds *in vivo*. The composition, in some cases, may comprise one, two, or more uremic toxin-treating enzymes, such as urease, uricase or creatininase. The oral delivery composition may be able to deliver the uremic toxin-treating enzymes, substantially undigested, to the intestines, where the enzymes can interact with uremic toxins transported to the intestines from the bloodstream. In another aspect, the treatment includes an oral delivery composition comprising a cell able to reduce the concentration of one or more uremic toxins *in vivo*. In some cases, the cell may be designed to overexpress one, two, or more uremic toxin-treating enzymes, such as urease, uricase or creatininase, for example, by transfecting the cell with a corresponding gene. In some embodiments, a species able to react with or otherwise sequester by-products of the uremic toxin-treating enzyme reactions may be included with the oral delivery composition. For example, if the by-product is ammonium, the species may be a sorbent able to adsorb ammonium, an enzyme able to react with the ammonium, or the like.